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Indian Standard

ANAEROBIC JOINTING COMPOUNDS FOR USE IN LIQUEFIED PETROLEUM GAS APPLIANCES AND INSTALLATIONS — SPECIFICATION

UDC 621-762 : 621·6·036

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

December 1992 Price Gruop 3

Adhesives Sectional Committee, PCD 15

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Adhesives Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

An Indian Standard, IS 3465 : 1966 'Specification for jointing compounds for use in liquefied petroleum gas appliances and installations' was laid down by Gas Cylinder Sectional Committee, EDC 16. This standard was basically based on bitumen compound. Oil companies discontinued to use bitumen based jointing compounds because whenever the joint was to be undone, it used to damage the threads. Therefore, currently oil companies use teflon tapes in place of bitumen jointing compounds.

Lately, anaerobic adhesives have been introduced in Indian markets for application in LPG appliances. Several oil companies have used these anaerobic adhesives on trial basis and have found them acceptable for the purpose intended. The Committee, therefore, decided to formulate a separate standard for anaerobic jointing compound.

Though no test has been prescribed for determination of physiological hazards of anaerobic adhesives, it is the responsibility of manufacturers to see that the adhesive is free of physiological hazards.

Considerable assistance has been derived in the preparation of this standard from Draft BS 6956 : Part 7 Specification for Anaerobic Jointing Compounds for Installations for Use with, 1st, 2nd and 3rd Family Gases.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

AMENDMENT NO. 1 MARCH 1999
TO
IS 13653 : 1992 ANAEROBIC JOINTING COMPOUNDS FOR USE IN LIQUEFIED PETROLEUM GAS APPLIANCES AND INSTALLATIONS — SPECIFICATION

(*Page* 1, *clause* 1.2) — Delete.

(PCD 12)

Reprography Unit, BIS, New Delhi, India

Indian Standard

ANAEROBIC JOINTING COMPOUNDS FOR USE IN LIQUEFIED PETROLEUM GAS APPLIANCES AND INSTALLATIONS — SPECIFICATION

1 SCOPE

1.1 This standard prescribes requirements and methods of sampling and test for anaerobic jointing compounds suitable for use where working pressure up to 2 000 kPa and temperature up to 65°C are encountered.

1.2 This material is suitable for sealing taper/parallel and taper/taper joints up to R 3/8 nominal sizes.

2 REFERENCES

2.1 The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
323 : 1959	Specification for rectified spirit
718 : 1977	Specification for carbon tetrachloride
554 : 1985	Dimensions for pipe threads where pressure tight joints are required on threads (*third revision*)
3178 : 1965	Specification for abrasive emery powder
13055 : 1991	Methods of sampling and test for anaerobic adhesives and sealants

The above mentioned standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated above.

3 TERMINOLOGY

For the purpose of this standard, definitions given in IS 13055 : 1991 shall apply.

4 MATERIAL AND DESCRIPTION

An anaerobic jointing compound shall be essentially based on acrylate esters, plasticizers and polymers suitably modified to achieve the properties specified in 5. It shall be a clear liquid or shall be of a paste like consistency, free from lumps and particulate matter or other deleterious material.

5 REQUIREMENTS

5.1 Jointing Properties

The jointing compound shall be such that it shall not permit any leakage when tested in accordance with Annex A. The jointing material shall permit dismantling without damage to the metal parts.

5.2 Resistance to Water, Hydrocarbons and Normal Temperature Extremes

5.2.1 The compound shall not:

a) react with liquid or gaseous hydrocarbons;

b) soften or swell in contact with liquid or gaseous hydrocarbons;

c) transmit hydrocarbons by permeation which will affect the sealing and this shall be ensured by the tests detailed in Annex B.

5.3 Resistance to Vibration

The jointing compound shall seal joints effectively against vibration and shall permit no leakage when tested as detailed in Annex C.

5.4 Viscosity

The jointing compound when tested in accordance with 7 of IS 13055 : 1991 shall have a viscosity of 500 to 800 mPas for liquids and 30 000-50 000 mPas for pastes.

5.5 Handling Cure Time

The handling cure time of jointing compound as specified by the manufacturers shall be examined as prescribed in 13 of IS 13055 : 1991. The nut should preferably cease to move within 15 minutes from the time of application of the compound.

5.6 Mechanical Strength/Locking Torque

The jointing compound shall have locking torque within the range of 4 Nm to 14 Nm when tested as prescribed in **11.1** of IS 13055 : 1991.

5.7 Resistance to Corrosion

The jointing compound shall not cause corrosion of copper, brass, aluminium or mild steel surfaces when tested in accordance with Annex D.

5.8 Freedom from Deleterious Contaminants

The compound shall have a gel time of not less than 5 minutes when tested in accordance with Annex E.

5.9 Storage Stability

The jointing compound when stored under the conditions specified by the manufacturer and in its original unopened containers shall retain the properties specified for a minimum period of one year. The material shall also pass the storage stability test as prescribed in **12** of IS 13055 : 1991.

6 SAMPLING

6.1 Sampling of the material shall be done as prescribed in **5** of IS 13055 : 1991.

6.2 Number of Tests and Criteria for Conformity

The tests for corrosion resistance, resistance to water, hydrocarbons and normal temperature extremes and storage stability are type tests and shall be performed for product approval whereas tests for viscosity, jointing properties, freedom from deleterious contaminants, mechanical strength, resistance to vibration and handling cure shall be carried out on each batch for acceptance of the product.

6.2.1 The type tests shall be repeated after some time interval as agreed to between the purchaser and the supplier whereas acceptance tests shall be performed on each batch.

6.2.2 The purchaser, however, at his discretion reserves the right to conduct both type tests and acceptance tests during acceptance of supplies.

6.3 A batch may be defined as consisting of any quantity of anaerobic jointing compound manufactured in a single mix at one time.

6.4 The lot shall be declared as conforming to requirements of the specification if all the test results on each individual sample meet the requirements prescribed in **5**.

7 PACKING AND MARKING

7.1 Packing

The material shall be packed in containers as agreed to between the purchaser and the supplier. Owing to the particular composition and nature of the compound such containers are never more than half full.

7.2 Marking

The containers shall be marked legibly with the following information:

a) Name and type of the material;

b) Indication of the source of manufacture, month and year of manufacture;

c) Batch number in code or otherwise, to enable the lot of supply to be traced back from records;

d) Shelf life/Expiry date;

e) Quantity of the material;

f) End use application;

g) Procedure and instructions for application of the material; and

h) Caution and precautions regarding:

    i) Handling and distribution of product.

    ii) Intended uses.

    iii) Requirements of law for safety instructions.

7.2.1 The product may also be marked with Standard Mark.

ANNEX A

(*Clause* 5.1)

METHODS OF TEST FOR DETERMINATION OF SEALING PROPERTIES OF ANAEROBIC JOINTING COMPOUNDS

A-1 TEST FOR JOINTING PROPERTIES

A-1.1 Apparatus

The following apparatus are required:

a) 5 R¼ brass male connectors, in accordance with IS 554 : 1985;

b) 5 Rc¼ mild steel female connectors in accordance with IS 554 : 1985;

c) 1 Rp¼ brass plug, in accordance with IS 554 : 1985;

d) Suitable pressure gauge;

e) Suitable oven; and

f) Suitable water bath.

A-1.2 Procedure

A-1.2.1 Rinse the threaded parts three times in cold 1, 1, 1, trichloroethane and allow to dry. Assemble each joint individually as follows:

Apply sufficient anaerobic jointing compound to each external thread in such a manner that the thread is completely filled. No compound shall be applied to the internal thread. Tighten each joint to a torque of 11·3 Nm taking care not to transmit the force to the joint (s) already made. After 15 minutes at ambient temperature, test the joints under water with nitrogen at 150 kPa pressure for 5 minutes. Inspect for leaks by observing the appearance of bubbles during the immersion period and ignoring those noted during first 15 seconds of immersion.

A-1.2.2 After the initial checks for leaks, leave the assembly at ambient temperature for 1 hour, again test the joints under water at ambient temperature with nitrogen at 2 535 kPa pressure for 5 minutes. The joints shall show no evidence of leaks in both the tests.

A-1.3 The test shall be repeated after the assembly has been held in a vertical position for 168 h at room temperature. The joints shall show no evidence of leaks.

ANNEX B

[*Clause* 5.2.1 (C)]

B-1 RESISTANCE TO WATER, HYDROCARBONS AND NORMAL TEMPERATURE, EXTREMES

B-1.1 Test Assemblies

Four assemblies shall be made as prescribed in **A-1.2** for testing jointing properties. The assembled assemblies shall be kept at 27 ± 2°C for 24 h and then each of the four assemblies shall be tested at 27 ± 2°C with nitrogen, under the test conditions described below in **B-1.2**, **B-1.3**, **B-1.4**, and **B-1.5**,

B-1.2 Water Resistance

One assembly shall be tested under water at 65°C, at the test pressure of 2 535 kPa for six hours.

B-1.3 Resistance to High Temperature

One assembly shall be heated through six continuous cycles (room temperature — test temperature — room temperature) each heat period being one hour at the test temperature, after which it shall be tested for leaks under water at ambient temperature with nitrogen at the test pressure for five minutes. The test temperature and pressure shall be 65°C and 2 535 kPa respectively.

B-1.4 Hydrocarbon Resistance Test

One assembly shall be kept in a bomb filled with LPG and allowed to stand vertically for 168 h at 27 ± 2°C. The assembly shall then be drained and filled with nitrogen at test pressure and tested under water for five minutes. The test pressure shall be the same as in **B-1.2**.

B-1.5 Resistance to Low Temperatures

One assembly shall be immersed in N-pentane externally cooled to – 20°C for one hour while filled with air or nitrogen at test pressure, as in **B-1.2**.

B-1.6 The joints shall be taken to have passed the test if they show no evidence of leaks.

ANNEX C

(*Clause* 5.3)

C-1 RESISTANCE TO VIBRATION

C-1.1 Preparation of Test Assembly

A R¼ size external taper thread conforming to IS 554 : 1985 shall be cut at one end of a 250 mm length of brass pipe of wall thickness not thinner than 2 mm. The corresponding internal parallel thread conforming to IS 554 : 1985 shall be cut hexagonal mild steel nut, 24 mm across the flats and 25 mm in length.

C-1.2 Procedure

The jointing compound shall be evenly applied by means of a brush over the whole of the external thread, none being applied to the internal thread. The nut shall then be screwed on to the pipe with a torque of 11·3 Nm and the assembly left at ambient temperature for 1 h.

The joint shall then be tested under water at ambient temperature with nitrogen at 1·5 bar (150 kPa) for 5 minutes.

The joint shall then be heated to the test temperature of 65°C and cooled to room temperature. This shall be repeated and each cycle (room temperature to test temperature) shall occupy 30 minutes. Twelve such cycles shall be carried out consecutively in 6 hours.

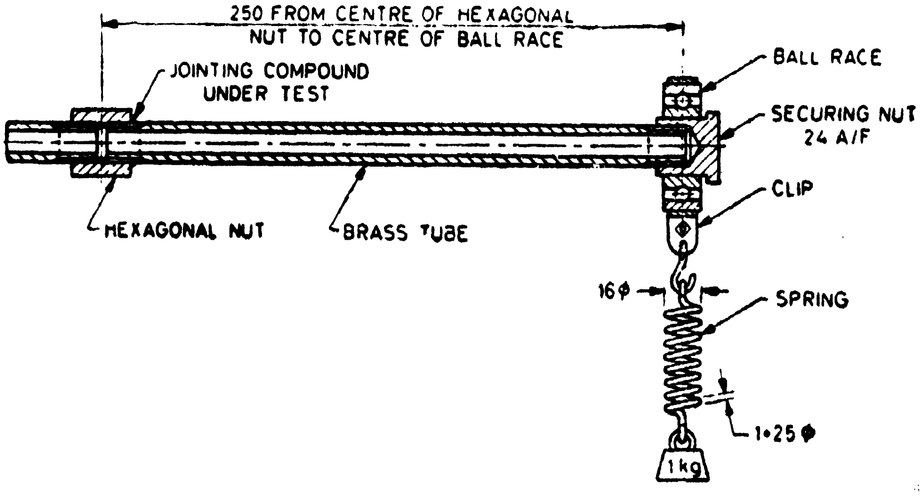
The hexagonal brass securing nut shall then be fitted with the pipe held horizontally, to an appliance capable of rotating the assembly at 700 ± 20 r/min about the horizontal axis.

A ball race shall be attached to the end of the pipe so that the distance from the centre of the hexagonal nut to the centre of the ball race is 250 mm, as given in Fig. 1.

A load of 1 kg shall then be hung freely from the ball race by means of a spring 50 mm long of approximately 0·524 7 N/mm rate and the joint subjected to 20 000 revolutions at 700 ± 20 r/min.

The joint shall be sound when tested under water at ambient temperature with nitrogen at the test pressure of 2 535 kPa for five minutes.

This test shall be repeated after the assembly has been held in a vertical position for 168 h at room temperature.


250 FROM CENTRE OF HEXAGONAL NUT TO CENTRE OF BALL RACE
JOINTING COMPOUND UNDER TEST
BALL RACE
SECURING NUT 24 A/F
CLIP
HEXAGONAL NUT
BRASS TUBE
16ϕ
SPRING
1·25ϕ
1kg

All dimensions in millimetres.

Fig. 1 Apparatus for Vibration Test

ANNEX D

(*Clause* 5.7)

D-1 TEST FOR RESISTANCE TO CORROSION

D-1.1 Apparatus

A glass beaker of 100-ml capacity.

D-1.2 Materials

D-1.2.1 *Metal Strips* — commercial copper, brass, aluminium and mild steel strips not less than 0·8 mm thick, cut into pieces 75 mm long and 13 mm wide.

D-1.2.2 *Emery Powder* — conforming to Grit size 150 of IS 3178 : 1965.

D-1.2.3 *Carbon Tetrachloride* — conforming to IS 718 : 1977.

D-1.2.4 *Rectified Spirit* — conforming to IS 323 : 1959.

D-1.3 Procedure

D-1.3.1 Polish each strip mechanically on the two faces to obtain a uniform finish free from defects. Clean and polish the strip with a pad of cotton wool and emery powder and then with successive pads of cotton wool until a fresh pad remains unsoiled, after use. Wash the strip with carbon tetrachloride and allow it to dry. Use clean forceps for all further handling of the strip.

D-1.3.2 Fill the beaker with a sample of jointing compound to within 6 mm of the top and with a spatula, level and smooth the surface. Coat each freshly prepared strip with a thin film of the sample for 48 mm from one end and insert that end vertically to a depth of 50 mm into the sample contained in the beaker. Press the surface of the sample into contact with the strip and level it again with the spatula. Place the beaker in an oven controlled at 45°C ± 1°C.

D-1.3.3 After 48 h, withdraw the strips, wipe them with cotton wool and wash them with rectified spirit. Examine the surface condition of the strip for etching, pitting or discolouration, and report the state of the strips in terms of:

a) etching;
b) pitting;
c) discolouration;
d) bloom; and
e) corrosion deposits.

ANNEX E

(*Clause* 5.8)

E-1 TEST FOR FREEDOM FROM DELETERIOUS CONTAMINANTS

E-1.1 Apparatus

The following apparatus is required:

a) Thermostatic water bath;
b) Test tube, approximately 25 mm internal diameter;
c) Glass stirring rods;
d) Stop clock;
e) Clamp; and
f) Stand.

E-1.2 Procedure

Place approximately 5 g of the compound in the test tube. Place the tube in boiling water and stir the contents gently and continuously. Record the time in minutes from the immersion of the tube for the material to gel or for lumps to form. If polymerization does not occur after 10 minutes, discontinue the test. Perform the determination in duplicate and report the mean of the two gel times as the stability at 100°C.

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Doc : No. PCD 15 (1114)

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Printed at Printwell Printers, Aligarh, India